

birds to its passage back into their blood through the secretion of the poison gland of the insect. At the same time he furnished conclusive experimental proof of the part played by the insect in propagating the infection. These fundamental observations have been confirmed and extended in various directions by other observers, both in the British Empire and elsewhere.

As a practical consequence of the discoveries of Ross and those who have followed in his footsteps, and of his own unceasing exertions and further investigations during the last few years, scientifically directed measures for the prevention of malaria have been initiated with striking success in many fever-stricken districts all over the world, and particularly within the British Empire. His investigations have also inspired similar work on the spread, by means of mosquitoes or other biting insects, of other formidable diseases, with the result that effective measures have been devised for preventing the spread of these diseases also.

Davy Medal.

The Davy medal has been awarded to Sir James Dewar, F.R.S.

Sir James Dewar has been a pioneer in the study of very low temperatures, their production, applications, and effects.

For many years he has worked continuously in this difficult domain, and his investigations have resulted from time to time in such achievements as the solidification of oxygen, the liquefaction of fluorine, and the liquefaction and solidification of hydrogen. His improvements in technique have been fundamental. By the construction of vessels in which thermal convection is avoided by the presence of a vacuous layer in their walls, he has enormously simplified the retention and manipulation of matter at very low temperatures. His application of the absorbent effect exerted on gaseous materials by charcoal at low temperatures has placed in the hands of chemists and physicists a most convenient and important method, not only for the production of high vacua, but also for the rapid separation of the constituents of gaseous mixtures. The modifications in the properties of matter at very low temperatures have been investigated, and remarkable results obtained, including the earliest exact investigations, jointly with Prof. Fleming, on the electric properties of insulators and of metals and alloys. The determination of the properties (critical points, boiling points, &c.) of refractory gases at very low temperatures has involved the practical downward extension of absolute thermometry, with the result that temperatures in the neighbourhood of the absolute zero can be determined correctly to within a degree. Lastly, recent measurements of the rate of formation of helium from radium salt, specially purified by Sir T. Edward Thorpe for his recent atomic weight determination, have provided exact molecular data, throwing light on the nature of the spontaneous disintegration of that very remarkable substance.

Hughes Medal.

The Hughes medal falls this year to Richard Tetley Glazebrook, F.R.S.

Dr. Glazebrook has for many years been closely identified with the construction, testing, and evaluation of electrical standards. Not only has he published important memoirs on these subjects, but, as secretary for a very long period of the Electrical Standards Committee of the British Association, and more recently as director of the National Physical Laboratory, he has taken a leading and responsible part in this type of scientific work and in conferences of international importance. It is thus specially fitting that he should be the recipient of the Hughes medal.

The anniversary dinner was held at the Hotel Metropole on Tuesday evening. Sir Archibald Geikie occupied the chair, and a large number of fellows and distinguished guests was present. In proposing the toast of "The Royal Society," Mr. Butcher, M.P., remarked that organised science presents the most signal example of cooperative enterprise in the things of the mind. Modern scientific research demands a host of humble labourers in every field. The hewers of wood and the drawers of water are as necessary as

the men of genius. Like the builder of a mediæval cathedral, the obscure worker in the laboratory adds his stone to the fabric, and passes from sight; the individual is effaced, and the structure that slowly rises is the collective achievement of many forgotten workers and even of many generations, guided, however, by a few master minds. While art and literature bear the stamp of permanence, the movement of the sciences produces another kind of effect—that of progressiveness and limitless expansion. Yet, in spite of this irresistible forward movement, the man of science, like the artist, is aware that the ideal may still escape his grasp, and that the quest of truth still remains the search for something that must ever be pursued, that ever recedes, and never can be wholly attainable.

Replying to the toast, the president said that at its foundation every side of intellectual life seems to have been represented in the society. The non-scientific elements which so preponderated at the start were gradually reduced as years went on, but a wide and liberal view of the claims of admission continued to be taken, and the more distinguished in each generation in affairs, in literature, and in art were elected as fellows. This custom is still kept up, but with increasing stringency, until now the number of such persons is limited to two in every two years. There are some fellows who believe that the general interests of the society would be promoted by the introduction of a larger leaven of culture which is not scientific.

The Japanese Ambassador, responding to the toast of "The Guests," said it is barely forty years since Western science was transplanted into Japan on anything like an adequate scale. For the progress being made Japan owes an immense debt of gratitude to the scientific men of the West, and particularly to scientific men of Great Britain.

NOTES.

THE meeting of the Royal Irish Academy on Tuesday, November 30, was occupied by a commemoration of Charles Darwin, the date nearly coinciding with that of the publication of "The Origin of Species" fifty years before. The president, Dr. F. Tarleton, opened the proceedings, and the following short addresses were given on the influence of Darwin's work:—geology, Prof. G. A. J. Cole; geographical distribution of animals and plants, Dr. R. F. Scharff; zoology, Prof. G. H. Carpenter; botany, Prof. T. Johnson; anthropology, Prof. A. F. Dixon.

THE Washington correspondent of the *Times* announces that a recommendation is to be submitted to the Department of Commerce and Labour by the Bureau of Fisheries that the Government should bring about an international conference for the formulation of an international marine game law to protect from extinction seals, whales, walrus, and other sea mammals. The countries which would be invited by the United States to send representatives to the proposed conference are Great Britain, Russia, and Japan.

THE council of the Child-study Society has approached Prof. Karl Pearson, F.R.S., to assist its efforts to advance scientifically our knowledge of child-life. Prof. Pearson has drafted a schedule for studying the factors influencing the social life of the child, which he desires to have filled in by heads of families or by teachers intimate with families. The number in the family need not be large, but particulars of father, mother, and at least two children are required. The schedules are being distributed through branch secretaries of the Child-study Society, but it may be difficult in a short time to secure the number requisite

to make the subsequent investigation by Prof. Pearson worth while. The society appeals to members of learned societies and to professional men and women to assist the scheme by applying for a copy of the schedule and filling in the particulars. Copies can be obtained from the secretary of the Child-study Society, London, 90 Buckingham Palace Road, London, S.W.

PROF. SORLEY, in his paper on "The Interpretation of Evolution" communicated to a meeting of the British Academy on the fiftieth anniversary of the publication of the "Origin of Species," drew a distinction between inorganic and organic evolution which appears to belong rather to the material forming the subject of the process than to the process itself. It is perhaps true that, as he says, physiologists are on the whole less satisfied now than formerly with the adequacy of the physico-chemical explanation of vital activities; but they have not all abandoned the idea of gaining a more profound insight than at present into the nature of life, nor do they anticipate that any increase of knowledge will tend to exclude vital phenomena from the domain of natural law. That the history of vital activity is in a true sense teleological may be readily conceded, and it is possible that Prof. Sorley is right in holding that the whole course of evolution can only be interpreted "by means of the conception of conscious purpose." Such contentions, however, belong to a domain which is outside that of science.

MR. BALFOUR'S Romanes lecture, delivered at Oxford on November 24, was couched in his happiest vein of genial scepticism. The chief function of literary and artistic critics in all ages has been, he said, to sweep away the rubbish of their critical predecessors. No standard of æsthetic excellence has been found to be permanent; attempts to find an ethical or religious end to art, though not valueless, are independent of the critical question. It is true that in the present age there is a superficial appearance of unanimity as to what is and what is not a successful work of art, though a man of genius like Matthew Arnold or Ruskin will occasionally kick over the traces; but in the history of artistic criticism this unanimity is not to be found. The great Gothic builders were only restrained by considerations of time and money from demolishing the work of their predecessors. Training and study are undoubtedly sources of subsidiary æsthetic pleasure, but the increase of powers of discrimination may be accompanied by a waning of æsthetic sensibility. Are we not, then, obliged to regard æsthetic emotion as a mere accidental by-product of evolutionary process? No assistance is afforded by the instinctive efforts of the popular philosophy to press morals, religion, utility, or progress into the service, nor can satisfaction be obtained out of the metaphysical treatment of the subject; but there remains the consideration that, besides the class of emotions to which the æsthetic sense belongs, there is another class, practical rather than contemplative, at the head of which are the loftiest feelings—love and devotion—of which human nature is capable. These practical emotions, Mr. Balfour thinks, are recalcitrant at present to any logical or philosophical treatment. Why, then, should we quarrel because we can at present find no adequate philosophy of the æsthetic emotions?

THE eighth International Zoological Congress is to be held at Graz (Austria) on August 15–20, 1910, under the presidency of Prof. Ludwig von Graff. The first general meeting of the congress will be held in the afternoon of August 15 in the great Stephaniensaal of the Steiermärkische Sparkasse, and further similar meetings the next and every

morning up to and including August 19. Sectional meetings will be held on each of the four afternoons from August 16–19 in the Natural History Institute of the University. A meeting of the nomenclature committee and the committee for the Concilium Bibliographicum has been arranged for August 16 in the Zoological Institute, and the permanent committee of the congress will meet at the same place on August 17 to consider the place of meeting for 1911. Two lantern lectures will be given during the evenings of August 16 and 17 on "Die Steiermark" (Styria), and "The Austrian Riviera, Bosnia, Herzegovina." In addition to short excursions during the late afternoon of the earlier days of the congress, longer journeys have also been arranged. Among the more ambitious excursions may be mentioned:—to the Erzberg and the Leopoldsdorf. See on August 20, to Triest on August 21 and to Dalmatia by special steamer from August 22–27. A banquet will be given by the congress on August 19 to the honorary members, members, and participants. Not only professional zoologists, but all persons interested in zoology, may take part in the congress, which covers the whole field of biology in the widest sense, including, for instance, palæozoology, hydrography, and marine biology. All inquiries relative to the congress should be sent to the Präsidium des VIII. Internationalen Zoologen-Kongresses, Universitätsplatz 2, Graz (Österreich).

WE have to acknowledge the receipt of a copy of No. 62 of the Hull Museum Publications, in which various additions to that museum are recorded; also of vol. v., No. 2, of the *Museum News*, the first article in which is devoted to an account of an exhibition of mediæval architecture in the Brooklyn Museum.

ACCORDING to the October number of the *Victorian Naturalist*, it is proposed to erect in Sydney a statue or some other appropriate memorial to Sir Joseph Banks, who has been called the "father of Australia." In order to awaken interest in the matter, Mr. J. H. Maiden, the Government botanist of New South Wales, has written a full and elaborate life of Banks, and has generously promised to hand over the profits on the sale of the volume to the memorial fund.

IN discussing a new digger-toad from Manchuria in the September issue of the *Proceedings of the Academy of Natural Sciences of Philadelphia*, Mr. T. Barbour takes exception to the emendation of the barbarous generic name *Kaloula* to the more classical *Callula*. Seeing that the emendation was made by Dr. Günther and accepted by the late Prof. Cope, and subsequently by Mr. Boulenger (in the official British Museum Catalogue), it is surely a little strong to write that "*Callula*, a more recent emendation, has no standing in nomenclature." Günther, Blanford, and Boulenger have all seen fit to amend (or accept amendments of) ill-spelt or ill-formed zoological names, and it scarcely becomes their juniors to say they were not justified in so doing.

IN the first portion of an article on the nuptial habits of the black-cock in Scandinavia and England, published in the November number of the *Zoologist*, Mr. Edmund Selous alludes to certain very definite statements made by a Swedish forester to the effect that these birds are in the habit of making burrows for themselves beneath the snow, in which they remain for considerable periods during severe weather. Although each bird makes its own tunnel, it seems probable that the tunnels may often open into a common chamber, where several black-cock may remain in company for the sake of warmth. The capercaillie, on

the other hand, has no need for such shelters—and perhaps food-supplies—as the pine needles which form its food are always obtainable in abundance.

THE November number of the *American Naturalist* opens with the first part of an instructive article, by Mr. Newton Miller, on the life-history and habits of the American toad, this article being written to illustrate the proper way of studying common American animals from the point of view of their position as active forces in the economy of nature. After devoting a considerable amount of space to the breeding-habits and development of the species, the author makes the (to us) novel observation that “toads are more numerous in and about towns than elsewhere. Very rarely is a toad seen in a large field under cultivation. Only fifty toads were seen during a whole season on one thousand acres of farming land in central Indiana. This scarcity may be accounted for by two factors, *i.e.*, first that pasturage and tillage kill the toads, or, secondly, that the extensive drainage has exterminated the toad by depriving it of breeding places.”

MUTATION in *Ceratium*, a protozoan common to fresh and salt water, forms the subject of No. 13 of vol. lii. of the *Bulletin of the Museum of Comparative Zoology* at Harvard College. After describing the mutations observed, the author, Mr. C. A. Kofoed, states that the most important fact in the phenomena is the abrupt and complete change in form in a line of descent in a single generation, or at most in two generations, of organisms asexually produced. The change is recorded in fixed skeletal parts which clearly show the transmutation in shape, while the accessory phenomenon of chain-formation enables the line of descent to be accurately traced. These changes do not give rise to new types, “but old well-known types give rise suddenly to others old and well known, or at least previously known. The particular category to which these types are referred, species, sub-species, varieties, or forms, is a subordinate matter. . . . The fact remains that like gives rise to unlike, that the descendants differ profoundly from the ancestral type.”

PROF. HICKSON and Mr. Wadsworth give an interesting account in the *Quarterly Journal of Microscopical Science* (vol. liv., part ii.) of their observations on *Dendrosoma radians*. This remarkable Acinetarian occurs in abundance on the stems of *Cordylophora* in the Bridgewater Canal near Altrincham, and supplies were also obtained from Birmingham. The authors give a detailed account of the minute structure of the adult and the formation and development of the ciliated gemmule. They find that the so-called “external buds” described by Saville Kent are really epizoid Acinetarians of the genus *Urnula*. The phenomena of conjugation have not yet been observed.

THE *Quarterly Journal of Microscopical Science* (vol. liv., part ii.) contains a continuation of Mr. Goodrich's well-known researches on the structure of the excretory organs in *Amphioxus*. Mr. Goodrich brings forward what appears to be very conclusive evidence in favour of his view that the nephridia of *Amphioxus* do not open, as Boveri has supposed, into the coelom, but end blindly at their inner extremities. He maintains the homology of these organs with the nephridia of Annelids and Platyhelminths, and not with the kidney tubules of the Craniata, and gives a partial, but very interesting, account of their development. He has examined the sections upon which M. Legros based his conclusions as to the origin of the nephridia from the coelomic epithelium, but does not agree with this author on this important point. We are left to conclude that the nephridia of *Amphioxus*

are probably ectodermal in origin, although the question is not discussed in detail at present. The paper also deals with the structure known as Hatschek's nephridium, and the discovery of solenocytes in this organ by Goldschmidt is confirmed. It appears to be a true nephridium, homologous with the posterior nephridia, but the fact that it opens into the alimentary canal (externally; it has no internal opening) remains unexplained. We must also direct attention to the valuable criticism of Prof. Hubrecht's views on the early ontogenetic phenomena in mammals, by Mr. Richard Assheton, which concludes the number.

IN a pamphlet recently published at Athens under the title of “*Ἰωάννης Λαμαρκ καὶ τὸ ἔργον αὐτοῦ*,” the author, M. Athanasios E. Tsakalotes, gives a very clear and impartial account of Lamarck's life and work. Passing in brief review the facts and dates of the famous French naturalist's scientific career, he enumerates the various systematic treatises that came from his pen, and enlarges on the evolutionary views which found expression in the “*Philosophie Zoologique*,” published just one hundred years ago. The main points in Lamarck's theory of descent are well brought out—his belief in the continuity of the process, his consequent rejection of Cuvier's theory of successive catastrophes, his doctrine of the inherited effects of use and disuse, and of the direct action of the environment on plants and on the lower animals. The author shows how intimately in Lamarck's mind the facts of adaptation were connected with the problem of evolution; the passage in the “*Philosophie Zoologique*” on the relation of structure to habit and function in the three-toed sloth might, he asserts, have been written by Darwin himself. That Lamarck's views failed to commend themselves to his scientific contemporaries was, the author thinks, partly his own fault; for the reasons that he was in too great a hurry in reducing his speculations to a complete system, and that he weighted his theory with improbable psychic elements, for example, the alleged influence of individual volition. The author might have added that Lamarck lacked the touch of genius that led Darwin and Wallace to find in natural selection the key to the problem of adaptation.

MR. CARUS-WILSON informs us that he has sent to the Kew Museum the specimen of oak in which stones are embedded, referred to in his recent paper on “The Natural Inclusion of Stones in Woody Tissue,” described in *NATURE* of November 25 (p. 117).

THE development of the embryo-sac of *Datisca cannabina* forms the subject of an article by Dr. W. Himmelbaur in the *Sitzungsberichte der Kaiserlichen Academie der Wissenschaften*, Vienna (vol. cxviii., part ii.). One division of the embryo-sac mother cell is the rule; otherwise, except for the early disappearance of the antipodal cells, development is normal. The author refutes the possibility of parthenogenesis, but finds that parthenocarp, *i.e.* the maturation of the fruit without fertilisation of the ovule, may occur.

A STUDY of trichomes as hereditary characters in a few pure and hybrid species of *Juglans*, *Oenothera*, *Papaver*, and *Solanum*, is described by Dr. W. A. Cannon in Publication No. 117 of the Carnegie Institute of Washington. It is apparent that the trichomes in these cases are not allelomorphs; in fact, they vary in size as much according to their position on the leaves as they do for different species. The development of the hairs on the leaves was also investigated for the species of *Juglans*, and found to be consistently uniform except in a single type observed in an F_2 , or second hybrid generation.

THE current number of *Irish Gardening* (November) opens with an account, by the Hon. Vicary Gibbs, of a few of the shrubs collected by Mr. E. H. Wilson during his last visit to China. About forty species of *Rubus* have been introduced, chiefly on account of their decorative foliage and stem colouring; also a number of new species of *Hydrangea*, *Ribes*, and *Vitis*. New climbers are furnished by the genera *Clematis* and *Lonicera*, of which *Clematis Pratti* and *Clematis souleana* receive special mention. A short report is given of a meeting held in Dublin by the Irish Forestry Society with the object of promoting an annual November "Arbor" week; the economic importance of forestry and the former extent of Irish forests formed the subject of addresses. A novel plan is mentioned in a note of etherising the roots of fruit trees to retard the blossom and so save it from being destroyed by spring frosts; the experiment is said to have been successful.

OWING to the custom which prevails so largely in Germany of making presents of plants at Christmas and on other auspicious occasions, there is a great industry in forcing plants, notably lilacs and cyclamen. As a consequence of this unnatural treatment diseases appear, or become more malignant, and in this connection a brochure by Dr. H. Klebahn, dealing with diseases in lilacs, has been recently published. A bacterial disease of the branches or leaves caused by *Pseudomonas Syringae*, and other leaf diseases due to a *Heterosporium* and *Botrytis*, are referred to, but the main purpose is to give the details of a new disease, traced after considerable trouble to a *Phytophthora*. Full details of the life-history, which is similar to that of *Phytophthora omnivora*, have been worked out.

WE have received from the Michigan State Agricultural College Experiment Station several bulletins dealing with subjects of practical interest. The construction of silos of wood and of cement is described, the latter material being found especially satisfactory. The number of silos in Michigan is steadily increasing; green maize is generally used, either alone or mixed with field peas, cow peas, or soy beans, &c. A description is given of the methods used in treating pigs for the prevention of hog cholera by injection of the appropriate serum; good results are said to be obtained. Another bulletin deals with the feeding of farm horses during winter time, a highly important economical problem. Several rations are suggested, and the cost is worked out in each case.

THE report of the Botanic Station Agricultural School and Experiment Plots, St. Lucia, is a record of continued progress. The soil under cultivation is generally very fertile, and as the population is not large the means of subsistence is easily gained by the natives. In consequence, the methods of cultivation are not very advanced, and there is abundant scope for the work of the agricultural instructors. Attempts are being made to develop the cultivation of Sea Island cotton, and also to assist the sugar industry. Improved methods of dealing with cacao and limes are being worked out, and the various pests submitted to examination. A number of rubber trees and mangoes have been distributed among the planters from the station.

THE bird problem in relation to agriculture is discussed in a recent number of the *Journal of Agriculture of South Australia*. Among insectivorous birds recommended to be encouraged are the wrens (*Malurus cyaneus*), the fly-catchers (*Rhipidura tricolor*, *Sisura inquieta*, *Micraea*

fascians), the robin (*Petroeca*, sp.), the swallows, the thrush (*Collyriocincla harmonica*), the pipit (*Anthus australis*), the catbird (*Pomatorhinus superciliosus*), and the yellow-rumped 'tit' (*Acanthiza chrysorrhoa*). On the other hand, the sparrow and the starling do great damage, and the advisory Board of Agriculture has recommended that stringent methods of dealing with them should be made compulsory.

IN continuation of his general discussion on the earthquakes of the Philippines, noticed in *NATURE* of October 28 (vol. lxxxi., p. 527), the Rev. M. Saderro Masó has undertaken the study of the different seismic regions of the archipelago. His first paper deals with the earthquakes of the Batanes Islands, a group in the extreme north, and only about 200 kilometres from Formosa. In the central island of Batan forty-nine earthquakes were recorded in the six years 1903-8, May and June being the months of greatest frequency. None of these shocks exceeded the degree of intensity 5 of the Rossi-Forel scale. Father Saderro Masó discusses the interesting question whether the Batanes Islands are more closely related seismologically with Formosa or Luzon, and, though the evidence is not very complete, concludes in favour of their connection with the latter and more distant island.

MR. T. SHEPPARD, the curator of the Hull Museum, continues his useful series of catalogues of the collections under his charge, which are issued at the nominal price of one penny each. The last numbers are devoted to an account of a large collection of Roman antiquities from South Ferriby, in North Lincolnshire, and of a number of Anglo-Saxon vases. These publications are issued in cooperation with the Hull Scientific Field Naturalists' Club, which is doing excellent work in cataloguing the fauna and flora of Yorkshire. The second part of its Proceedings for the current year is largely devoted to an account, by Mr. T. Stainforth, of the spiders, harvestmen, and pseudo-scorpions of East Yorkshire.

THE common horseradish (*Cochlearia armoracia*, L.) has been described by Darwin and others as a plant which practically never produces seeds. M. J. Brezezinski contributes to the Bulletin of the Cracow Academy of Sciences, No. 7 (1909), some interesting experiments on this point. He adopted two plans of favouring the production of seeds—grafting and an annular incision round the root. The former plan was a failure, but the latter led to the production of a good number of seeds, some of which germinated and have grown up. These seedling plants belong to two widely differing types, of which illustrations and descriptions are given.

A PAPER on the decimal system of numbers is contributed to the *Popular Science Monthly* for November by Dr. L. C. Karpinski. It contains a historical account of the Babylonian, Roman, Greek, Hindoo, and Arabic systems. A necessary conclusion is that improvements in the system of numeration have been slow to obtain adoption. Even at the present day France does not possess a decimal system of numeration, the use of 20 as a base being still preserved in numbers above 60, a system which, we are told, is of Semitic origin, and exists also among certain Pacific Coast tribes. It exists also in Wales. As a further illustration, the author refers to the slowness of the United States and England to adopt the metric system.

THE principal of the Belfast Municipal Technical Institute has drawn up a valuable series of notes on the method of conducting experiments set in laboratory courses of experimental science. The guidance offered is intended to secure a desirable amount of uniformity in the conduct of the

various laboratory classes in the institute. It is, we notice, made clear that the teachers in charge of the laboratories concerned are at liberty to modify the suggested scheme to meet their special needs. The notes should be of assistance to young demonstrators who are gaining experience as indicating what a successful teacher has found to be a good plan of procedure, but any slavish copying of a hard and fast routine would be undesirable in most cases. The notes have been printed for distribution among the staff at Belfast.

THE *Physikalische Zeitschrift* for November 10, and part xx. of the *Berichte der deutschen physikalischen Gesellschaft*, are both devoted to reports of the physical papers read at the *Versammlung deutscher Naturforscher* held at Salzburg in September. The former periodical gives, in addition, reports of the discussions following the reading of the papers. An afternoon sitting was devoted almost entirely to papers on the problems which arise in the treatment of radiation and in the building up of electrodynamics on the principle of relativity. Prof. Sommerfeld discussed the composition of velocities, and Dr. M. Born the dynamics of electrons on the theory of relativity. Prof. Einstein gave an interesting account of the development of our views of the origin and constitution of radiation, an account which will be of special value to those who are looking forward to the appearance of Sir Joseph Larmor's recent Bakerian lecture.

MESSRS. ELLIOT BROTHERS are making an accelerometer and gradient measurer, devised by Mr. H. E. Wimperis, which is both ingenious and simple and is free from disturbance by motions of any kind, except that of acceleration in one direction or of tilting in the same direction. Two vertical spindles are geared together so as to run in opposite directions, and they are each eccentrically weighted, and the weights are so placed that their motions in the direction marked upon the instrument are the same and conspire in their effect, while those transverse to this direction are opposite and neutralise each other's effect. One of the spindles carries a copper disc damped by a permanent magnet, an index moving over the scales of acceleration and gradient, and a controlling hair-spring. Such a combination is unaffected by rotational movement or by rotational acceleration of the instrument about any axis whatever; it is also unaffected by transverse or vertical motion or acceleration, or by longitudinal steady motion. It is therefore affected by longitudinal acceleration or by fore and aft gradient alone. As either fore and aft tilting and fore and aft acceleration are of necessity both operative, it is impossible merely by taking a reading to tell how much of the deflection is due to each if the two causes act simultaneously. The user is therefore instructed how to arrange that one of the effects is zero, or, if they both act together, to determine one by an independent observation. A large number of illustrations of the utility of the instrument are described, including power of engine, efficiency of brakes, friction when running idle, and measurement of gradients.

WE have received the first part of Dr. Ludwig Koch's "Pharmakognostischer Atlas" (Leipzig: Gebrüder Borntraeger), which is intended to form a supplement to the recently completed work by the same author on the microscopical analysis of drug powders. The atlas will deal mainly with the crude drugs of the German Pharmacopœia, and will contain illustrations and descriptions of sections cut in various directions, the illustrations being sufficiently extensive to show, not only the nature of the elements that occur, but also their relative quantity. Judging from the first part, the figures, so important in a work treating of structural details, will leave nothing

to be desired in clearness or accuracy, and the descriptions, though minutely detailed, will be readily intelligible. The work promises to be one of the most valuable of its kind, and to be indispensable to everyone interested in the anatomical structure of drugs.

MESSRS. J. J. GRIFFIN AND SONS have issued their list of chemicals manufactured by C. A. F. Kahlbaum, of Berlin. In comparison with their previous list there has been an expansion from 79 to 95 pages. As compared with the German price-lists of Kahlbaum and Schuchardt, the present list shows an increase of price amounting, in the case of typical materials, to about 35 per cent., but as the English prices include cost of freight, bottles, and packing, the difference on small orders is not excessive, and there can be no difference of opinion as to the advantages gained by having a stock of these materials available in London for immediate use.

THE Journal of the Chemical Society for October contains an interesting paper by Mr. R. W. Gray and Mr. F. P. Burt on the atomic weight of chlorine. The work is divided into three parts—a revision of the density of hydrogen chloride, a re-determination of its volumetric composition, and a study of its compressibility at 0° between the limits 780 mm. and 150 mm. The density was measured by an ingenious application of the condensing action of charcoal cooled by liquid air, as suggested and used by Dewar and Jones. The gas to be examined was condensed by liquid air, carefully purified by fractional distillation, and transferred for measurement of volume to a flask of 460 c.c. capacity surrounded by ice and distilled water, and connected to a manometer; for measurement of weight it was connected to a charcoal bulb having a capacity of only about 20 c.c.; when cooled with liquid air the charcoal absorbed the whole of the hydrogen chloride, leaving a vacuum both in the weighing and measuring bulbs, and by closing the bulb by a stop-cock its weight could be determined at atmospheric temperatures. The average density, after correcting for adsorption of gas by the walls of the measuring bulb, was found to be 1.63915 grams per litre. The volumetric analysis, carried out by measuring the volume of hydrogen set free by the action of aluminium on the gas, gave a mean volume of 1.00790 vols. hydrogen from 2 vols. hydrogen chloride. Combined with Morley's value for the density of hydrogen, the authors' own value for the density of hydrogen chloride, and Morley's value for the ratio of oxygen to hydrogen, this gave the atomic weight 35.459. A comparison of the densities of hydrogen chloride and oxygen, both corrected for deviations from Boyle's law, gave $Cl = 35.461$. The mean value $Cl = 35.460$ coincides exactly with the mean of seven recent determinations ranging from 35.452 to 35.466, and there can be little doubt that the figure is substantially correct.

THE firm of Gauthier-Villars, of Paris, has published the first of a series of volumes projected under the general title "Savants du Jour." The present book deals very appropriately with M. Henri Poincaré, whose work is known to men of science everywhere. The frontispiece to the volume is an admirable portrait of M. Poincaré. The text is divided into seven sections; the first is in the form of a biography, which comprises the discourse by M. Frédéric Masson last January in response to an oration by M. Poincaré when received by the Académie Française, a chronological list of the distinctions conferred upon the subject of the work, and a list of the appreciative articles upon his career which appeared in the French Press. The succeeding six sections are concerned, respectively, with

M. Poincaré's works in mathematical analysis, analytical and celestial mechanics, mathematical physics, and scientific philosophy; his obituary notices of numerous men of science, including the late Lord Kelvin; and his more various writings. Each of the sections dealing with M. Poincaré's scientific work is prefaced by an appreciation by some great authority; thus, that on celestial mechanics is preceded by a translation of Sir George Darwin's address in presenting the gold medal of our Royal Astronomical Society last February. The price of this interesting volume is 7 francs.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN DECEMBER:—

- Dec. 2. 6h. Venus at greatest elongation, $47^{\circ} 18' E$.
 „ 18h. Mercury in superior conjunction with the Sun.
 6. 10h. 35m. Jupiter in conjunction with the Moon (Jupiter $3^{\circ} 35' S.$).
 12. 7h. 45m. Sun eclipsed, invisible at Greenwich.
 „ 19h. 27m. Mercury in conjunction with the Moon (Mercury $0^{\circ} 3' S.$).
 14. 13h. 51m. Uranus in conjunction with the Moon (Uranus $3^{\circ} 5' N.$).
 16. 3h. 10m. Venus in conjunction with the Moon (Venus $2^{\circ} 50' N.$).
 18. 9h. Mercury in conjunction with λ Sagittarii (Mercury $0^{\circ} 3' N.$).
 20. 10h. Saturn stationary.
 „ 11h. 56m. Mars in conjunction with the Moon (Mars $5^{\circ} 0' N.$).
 „ 21h. 2m. Saturn in conjunction with the Moon (Saturn $1^{\circ} 40' N.$).
 27. 8h. 30m. Neptune in conjunction with the Moon (Neptune $4^{\circ} 9' S.$).
 „ 20h. 1m. Mercury in conjunction with Uranus (Mercury $1^{\circ} 43' S.$).

HALLEY'S COMET, 1909c.—The following is a further extract from Mr. Crommelin's revised ephemeris for Halley's comet as given in No. 4359 of the *Astronomische Nachrichten*:—

Ephemeris.

1909	R.A. (1910.0)	Decl. (1910.0)	log r	log Δ	Magnitude
(Berlin M.T.)	h.	m.			
Dec. 1.4	... 4	26.9	... +15 52		
6.4	... 4	6.2	... +15 23	0.3775	0.1505 ... 12.4
11.4	... 3	44.4	... +14.45		
16.4	... 3	22.3	... +14.4	0.3527	0.1340 ... 12.0
21.4	... 3	0.6	... +13.18		
26.4	... 2	40.2	... +12.28	0.3259	0.1381 ... 11.8

From this we see that the comet is now a little to the west, and south of, Aldebaran, and on December 4 will pass very near to γ Tauri.

According to a note by Mrs. Maunder in the *Daily Chronicle*, Mr. Hollis found the comet a conspicuous object in a 10-inch telescope on November 22, and the Rev. T. E. R. Phillips observed it the same evening, and was still able to see it when the aperture was reduced to 3 inches. Photographs taken at Greenwich on that date showed the comet to be somewhat brighter than the tenth magnitude, i.e. about eight times as bright as computed.

OBSERVATIONS OF MARS.—Seven new canals, bringing the total found at the Hem Observatory up to twenty-three, are announced by Mr. Jonckheere in No. 4371 of the *Astronomische Nachrichten*. For two of them, leaving the Cyclopus Lucus and going to Hephæstus and Amenites respectively, Mr. Jonckheere proposes the names Cepheus and Cassiopeia.

The *Comptes rendus* for November 15 (No. 20) contains three notes dealing with the planet. In the first M. Idrac describes the visual and photographic observations made by him at Meudon during the recent opposition. The photographs were taken in the focus of the 24-inch photographic equatorial, and show a fair number of details, some of which were not visible, or very faint, to the naked eye; the plates used were sensitive to the blue and ultra-violet radiations. On September 20 the edge of the north polar cap was

shown clearly on the photograph, and on September 25 extended down to about latitude 55° .

In the second note M. Antoniadi describes the results of thirteen nights' observations made between September 20 and November 9. The most remarkable changes, since the opposition of 1907, appear to be the return of Syrtis Major to the form it had in 1864 and 1877, the re-appearance of Lac Moeris, and the formation of a multiple "island" in the eastern part of the Mare Cimmerium. About fifty "canals" were seen, but M. Antoniadi discusses the meaning of this term before applying it definitely to the features seen. He defines eight types of markings which may be called "canals," and finds that there is no geometrical *réseau* of straight lines intercrossing on the surface of Mars; but across the continental areas there is a structure like a grey marbling, which is too evanescent and intricate to be drawn. A useful chart (Mercator) accompanying the note embodies the features seen at Meudon.

MM. de la Baume Pluvinel and F. Baldet contribute the third note, which describes the photographic researches carried out on the Pic du Midi during September and October. Ordinary plates were used at first, with exposures of 0.1s., but these showed only the polar caps. Later exposures, with Lumière colour filters and various bathed plates, took 6s. to 12s., and show nearly all the details observed visually; the geometrical *réseaux* of fine canals are not, however, to be found on the photographs.

During the recent opposition, M. Kostinsky, using the Pulkowa astrographic telescope, succeeded in obtaining photographs of the two satellites Phobos and Deimos, and now publishes the measures in No. 4369 of the *Astronomische Nachrichten*. The accordance with the ephemeris (based on Struve's elements) is satisfactory, and the photographic magnitudes of the satellites are 11.6 and 12.3 respectively.

PERRINE'S COMET, 1909b.—An observation of Perrine's comet, made at Heidelberg on November 20, gave the position at 13h. 0.2m. (Königstuhl M.T.) as 7h. 6m. 20.33s., $+15^{\circ} 31' 28''$ (1909.0), and the magnitude as 14.0 (*Astronomische Nachrichten*, No. 4371).

In No. 4369 of the *Astronomische Nachrichten* Prof. Wolf directs attention to an abnormal decline of the brightness of this object about November 9. On October 11 it was seen with difficulty in the reflector, and on November 6 could not be found visually, although since September 5 it has been observed visually with a 6-inch telescope. A photograph taken with the Bruce telescope on November 9 failed to show any trace of the comet, which must therefore have become enormously fainter.

THE DESIGN OF SPECTROGRAPHS.—All those who are interested in the design and performance of spectrographs, more especially such as are used for radial-velocity determinations, will welcome a paper by Mr. J. Plaskett which appears in No. 4, vol. iii., of the *Journal of the Royal Astronomical Society of Canada*. As is now generally known, Mr. Plaskett has, since 1905, devoted a great deal of labour to the design of a generally effective instrument, and he has now succeeded in producing a single-prism spectrograph which has proved beautifully effective. Rigidity, temperature control, and optical efficiency have all been provided for, and the instrument can be changed from a one- to a three-prism spectrograph in two minutes without affecting the temperature conditions. Mr. Plaskett gives illustrations and full details of the numerous minor devices and accessories, which it is impossible to reproduce here.

THE ASTRONOMICAL SOCIETY OF WALES.—No. 3, vol. xi., of the *Cambrian Natural Observer*, the quarterly record of the Astronomical Society of Wales, contains several useful notes for amateur observers. Miss Hagerty contributes an interesting article on solar energy, and Mr. Mee asks all Welsh observers to forward to him accounts of any astronomical phenomena they may observe; he gives some useful hints as to what the naked-eye observer may see and should record.

BRITISH ASTRONOMICAL ASSOCIATION.—Messrs. Neill and Co., Edinburgh, have just published, for the British Astronomical Association, a general index of the *Journal* from vol. i. to vol. xviii. The index has been compiled by Mr. F. W. Levander.